may belong to unrelated biologic substances. Unless the history of environmental or occupational exposure or other telltale circumstances in the patient's story point the way, it is often difficult to prove that certain of the positive skin reactions have any diagnostic or therapeutic significance. Whether or not any or all of the substances to which the allergic individual's skin responds are real or potential sources of trouble is still a puzzling problem. It is to be hoped that serologic studies on multiple sensitization now in progress may help to clarify our knowledge of this subject.

II. RESULTS OF DESENSITIZATION THERAPY

In considering treatment reference will be made only to hay fever and asthma concerning which our knowledge is more precise. It is difficult to gain any worthwhile viewpoint of the value of specific treatment in these conditions by merely giving the percentage of patients relieved of symptoms. Of more importance is a consideration of the factors which modify the results of treatment in the individual case. Of these factors, the allergic constitution and the presence of nasal and bronchial infection probably affect the therapeutic result obtained more than any others.

The significance of the allergic constitution in its relation to treatment is well illustrated by the hay fever patient. One who has treated many of these patients will bear witness to the marked relief from symptoms which may be obtained by a series of injections with gradually increasing doses of the offending pollens. Although the sensitiveness of the patient to the causative pollen may have been reduced to the extent that he is symptom-free, yet one cannot regard him as cured. His state of hypersensitiveness has been merely lowered for the time being so that he can lead a normal life. Evidences of sensitization of the skin and mucous membranes still remain, however, for introduction of the specific pollen by the cutaneous or intracutaneous route will still produce an urticarial wheal. In other words, desensitization has not fundamentally altered the reactivity of the body cells; in fact, after exposure to abnormally large quantities of pollen in the air a desensitized patient may still develop hay fever symptoms. It may be argued that an equilibrium or balance has been brought about in the body of the individual with an inherited hypersensitiveness [11] and that a certain quantity or pollen may be inhaled without upsetting this balance, whereas an overdose will disturb this equilibrium and give rise to a recurrence.

It is true that for greater completeness of relief it is necessary to treat a hay fever patient for at least several seasons, and in many instances to administer some treatment every season. The common impression that a course of pollen injections carried out over one season will cure hay fever has no basis in experience. However, even though not permanent, desensitization of a hay fever patient gives marked seasonal relief and is decidedly worth while. Because of the comfort which such treatment gives them, hay fever sufferers are often among the most grateful of our patients.

490 Post Street.

HELIOTHERAPY IN PULMONARY TUBERCULOSIS—ITS POSSIBILITIES AND DANGERS*

By CARL R. HOWSON, M. D.,
Los Angeles

DISCUSSION *by Ralph B. Scheier, M. D., San Francisco; Roland Davison, M. D., Tucson, Arizona.*

AT the present time we are on the crest of a wave of enthusiasm concerning the use of light in the treatment of various diseases, particularly tuberculosis, and are being deluged with literature extolling the virtues of appliances for the production and application of the healing rays. Nature and old Sol are being improved upon at every turn, so that the uninitiated is at a loss to know just which to advocate, for he is assured on all sides that he must employ this or that lamp or be shamelessly neglectful of a heaven-sent opportunity to cure his patients of whatever may ail them. The public has been educated by the lay press to the wonderful possibilities of this type of therapeusis, and if the physician does not take the initiative he is likely to find his judgment called into question or his patient leaving him for the more up-to-date chiropractor or naturopath, who is availing himself of the latest "scientific" appliances unhampered by scientific considerations as to possible limitations and dangers. And in self-defense many have apparently decided that when in doubt as to the diagnosis or the treatment actinotherapy should be tried, and tried thoroughly, whether the case be one of acute dermatitis venenata or some obscure internal disorder. If it be tuberculosis, the first thought is for light treatment or sun baths; and I fear that the present tendency to overenthusiasm will be followed by a reaction which will result in discrediting a valuable therapeutic agent.

The idea that healing powers reside in sunlight is not new. From Hippocratic times to the present, tuberculous patients have been advised to expose their bodies to the sun's rays. In recent years Rollier has done much to popularize the treatment by the results obtained in his sanatorium in the Swiss Alps, particularly in nonpulmonary conditions.

EFFECTS OF SUN BATHS

Sun baths increase metabolism, and exert a tonic effect which may be quite marked, producing a very definite euphoria. Rollier places great stress on the mental uplift many patients experience. Just how these effects are accomplished is still to be determined, for the action is a complex one. It seems probable that transformation of energy plays a part, that the vasomotor stimulation is of great value, and that possibly the skin is also stimulated to produce vitamins and antibodies. Following several weeks' heliotherapy the skin assumes a beautifully smooth, velvety appearance which is quite striking and characteristic. The fine muscular development of many tuberculous patients who are taking heliotherapy

* Read before the Los Angeles County Medical Association, October 20, 1927.

but no exercise is even more so. It has been suggested that this latter is due to the continuous light massage of the skin by the moving air, though Rollier is of the opinion that it is rather due to the stimulation of the nerve endings in the skin, producing tonic impulses to the muscles.

VASOMOTOR STIMULATION OF AIR BATHS

Sir Henry Gauvain, in a most illuminating article in *The Lancet* recently (April, 1927) states that "Hill and Argyle-Campbell have shown conclusively that a constant rise in metabolism occurs after a course of sun treatments, but this rise is due to exposure of the nude skin to cold air, not to sunlight. It occurs either in shade or sun, and is, as might be expected, greater in winter than in summer. Alpine writers attribute this effect to sunlight. This is incorrect." He goes on to analyze the various factors involved, and concludes that perhaps the most important ones in the treatment are the changing temperature, the changing motion of the air, the varying intensity of the sun, and the varying humidity. The effects of these may be summed up as vasomotor stimulation, the changes serving to maintain a varying stimulation, thus avoiding vasomotor fatigue with subsequent depression.

Much has been done in an endeavor to determine wherein lay the particular healing element. It was a matter of common observation that exposure to the sun in hot weather was uncomfortable and depressing to most people, and what was more natural than to conclude that the invisible rays of the spectrum, which were known to be chemically active, were the essential ones from a therapeutic standpoint. Finsen was the first outstanding therapeutist to emphasize the ultra-violet rays. Study was soon concentrated on them, and for the past decade they have held the stage almost to the exclusion of the remainder of the spectrum.

PENETRABILITY OF RAYS

In view of the inclusive claims which have been made for their virtues, it is of interest to note a few points. The ultra-violet rays comprise only about 1/1,000,000 of the sunlight. Ultra-violet rays are very quickly absorbed by water vapor and dust in the air, so that only a small proportion reach the earth in dull weather or in smoky localities. Their power to penetrate tissue is very slight, probably no rays reaching below the skin. The body protects itself against them by the formation of pigment—tanning. (The tanning which results from exposure to the ultra-violet rays of the quartz lamp differs from that formed in response to the sun's rays. It is not an unusual thing to observe a patient lose the sun tan while using the quartz lamp.) Accurate knowledge is still lacking as to their action upon the tissues, and many clinical phenomena await an adequate explanation. Certain of these appear contradictory at first sight. For instance, individuals derive benefit from exposure to light in approximate proportion to the amount of pigment they develop—to the degree of tan. In other words, as they provide their own shade! It is seldom possible to give more than very brief exposures until tanning has begun. Heliotherapy has been in use for several years at various places in this country, particularly Perrysburg, N. Y., with an altitude of about eleven hundred feet and the great amount of dull weather which is characteristic of sections contiguous to the Great Lakes. On dull days their patients are exposed to light from lamps of various types, and the results obtained in this climate are quite equal to those obtained in the high Alps where the maximum of sunshine is to be had. (It is noteworthy that even on dull days air baths are kept up as long as the temperature will permit.) The question thus naturally arises, are the ultra-violet rays the only ones of importance, or even the most important, and to what extent are the representatives of the quartz lamp manufacturers justified in their claims for superiority over the rays provided by nature? How shall we reply to the statement made by one of them recently to a patient of mine who had been using a quartz lamp during the winter months, and announced her intention of discontinuing it and taking sun baths? Expressing his astonishment that I should countenance such a move, he said, "That is like leaving a banquet for a sandwich."

VARIETY AND VALUE OF RAYS

Much has been written but there is as yet very little scientific data as to how many of the different rays are of value and which are the most valuable. The ultra-violets are undoubtedly important, but it is equally certain that the other rays are not to be ignored. The best results appear to be obtained from the use of the entire solar spectrum, and the most satisfactory artificial lamp is that which produces a light most nearly approximating the sunlight.* For this reason the carbon arc is probably to be preferred over all other lights which have been placed on the market to date, though even its spectrum contains a slight excess of ultra-violets. With the tungsten carbons, which are commonly used, this excess is quite marked. LoGrasso and his coworkers at Perrysburg have for some years been engaged on this problem, and feel that the excess of ultra-violets is undesirable, and they filter them out by the interposition between the (carbon arc) lamp and the patient of a thin sheet of mica.

AIR BATHS

A much neglected corollary to the sun bath is the air bath, which is simply the exposure of the skin to the air. This can be done irrespective of the absence of sunlight so long as the temperature is such that the patient does not chill. As noted above, the effect is one of vasomotor stimulation, and is very similar to that obtained in the sunlight, but the action and reaction are much milder. The air bath "plays a more important part in improving the vigor than has been recognized," and I believe that its value is probably equal to that of the sunlight. It is probable also that the reason the sun's rays give better results than

* A possible exception may be made with respect to rickets and tetany, in the treatment of which the ultra-violet rays appear to be the essential ones.

artificial light is that the sun bath is given in the open while the others are usually given in a small room, where the tendency is for the air to stagnate. Egbert of El Paso has recently (*Southwest Medicine,* April, 1927) reported some interesting experiments which indicate that the action of the ultra-violet rays without air baths may be decidedly detrimental to the patient.

In addition to the effects already noted, exposure of *any part of the body* to the sun in pulmonary tuberculosis produces congestion at the focus of disease in very much the same manner as tuberculin, and herein lies a possibility of danger to which sufficient emphasis has not been given, for it is a very real danger, and has always to be kept in mind when considering the use of light. This reaction has been responsible for many bad results, and much unfavorable criticism. In his introduction to Rollier's "Heliotherapy" Saleeby pays his respects to "those who . . . begin by exposing the chests of phthisical patients to the midday sun for an hour or so, and then infer from the subsequent pyrexia, hemoptysis and autopsy that sunlight is useless in pulmonary tuberculosis."

CASE REPORTS

To illustrate this phase of the matter I shall quote briefly from two typical case records selected from a large number.

CASE 1—T. K., a young man of twenty-nine with a chronic peribronchial lesion of the left lung and early peribronchial involvement of the right, had been slowly losing ground, and finally quit work and went to bed under the care of his mother. She had in her youth had active pulmonary tuberculosis, and been given sun treatment with apparently excellent results. This experience, together with what she had read in the columns of a local paper devoted to advice on health matters, edited by a so-called naturopath, convinced her that the one thing additional her son needed was sun baths. Accordingly, one unusually bright spring day she exposed the front of his chest for fifteen minutes, and repeated it next day. He felt poorly after the first exposure, and following the second one developed acute pleurisy, accompanied by bronchopneumonia on the better side. This seemed to be the turning point with him, for it was followed by a dissemination of the tuberculous process in the right lung and a rapidly progressive condition which terminated in death.

CASE 2—G. H., age thirty-three, physician, was suffering from far advanced bilateral pulmonary lesions with extensive cavitation and involvement of the intestines and larynx. He was in an institution in a neighboring state, and had made some progress, but his condition was not considered satisfactory, so sun treatment was begun, the exposures rapidly reaching an hour. In three weeks he lost twenty-two pounds and developed a marked repugnance to food, with extreme nervousness and insomnia. His basal metabolic rate was found to be plus 40, and a diagnosis of hyperthyroidism made. He was sent here for x-ray treatment of the thyroid. On arriving, he continued his rest regimen without either sun baths or x-ray treatment, and in a few days his symptoms returned to normal. Improvement from that time on was all that could be desired.

Because of similar ill effects, many of the European clinicians consider sun treatment contraindicated in pulmonary tuberculosis. I am informed that this view is held by most of those in the vicinity of Lysin where Rollier's institution is located. This I believe to be an extreme view, and the opinion of most of the careful workers in this country is that it may be of great value, provided its dangers are kept in mind.

TECHNIQUE

What, then, are the rules for the use of the sun's rays in the treatment of pulmonary tuberculosis? For, as Gauvain says, "Sun treatment is not mere exposure to the sun. The technique requires skill, care and gradual application."

Patients should first develop a tolerance to the air by carefully graduated air baths. While it is possible to get unfavorable reactions from these, they are much less likely to occur than from exposure to sunlight. They may be given for five minutes twice daily, increasing five minutes a day. The limitation to their final duration is the temperature of the air. They may be continued through the patient's waking hours.

After becoming habituated to the air for a period of an hour or more, he may be started on sun baths, and for these the skin should be directly exposed. If for reasons of privacy this is impossible, a thin white garment will permit the passage of a great portion of the rays. Ordinary window glass cuts out about 75 per cent of the ultra-violet rays of the sun. The head should always be kept covered and the eyes protected by dark glasses. Extreme care is necessary in graduating the dose, *i. e.,* in the duration of the treatment, and it is according to the skill with which the dose is graduated that the treatment will be a success, a failure, or worse than a failure. It should never be sufficient to cause sunburn. It should also be borne in mind at the outset that certain types of blondes are never able to take sun baths. They simply burn and peel, and manifest unfavorable reactions, no matter how often the treatment be tried or how carefully the dose be graduated. They may, however, be benefited by air baths.

GRADUATED EXPOSURE

Elaborate tables have been devised as guides, that of Rollier being in most general use, and they may be used if desired. A simple method is to expose the feet for five minutes morning and afternoon on the first day, to the knees for the same time the second day, including the thighs the third day, to the waist on the fourth day, with the addition of the arms on the fifth day. The chest should at all times be kept covered with a material sufficiently heavy to prevent penetration of the rays. On the sixth day the exposure of the day before is repeated, and the back of the legs to the knees exposed for five minutes, the following day the back of the thighs is included, the next day to the waist, and the next day the back of the arms, thus giving an exposure of the whole body except the chest for five minutes on the front and five on the back. The exposures may then be increased to seven minutes, then ten minutes, increasing thereafter five minutes a day until a total of one hour or more is reached. When definite evidence of tanning is seen, then, *and not until then,* the chest may be cautiously exposed, beginning with one minute and increas-

ing one minute daily until the time of exposure equals that of the rest of the body, the exposure time of which has not in the meantime been increased. A transient erythema, its duration measured in minutes, is usual. A reddening of the skin, lasting twelve hours or more, constitutes a burn, and should be avoided. If it does develop, the baths should be discontinued until it has subsided. At all times the patient must be under the supervision of his physician, who must be vigilant to detect any signs of unfavorable reaction.

UNFAVORABLE REACTIONS

These unfavorable symptoms are those of overstimulation, either constitutional or focal. Constitutional symptoms include increased temperature persisting longer than half an hour after the bath (there is always a transient increase in temperature), a feeling of fatigue or weakness, dizziness, nausea, headache, increased pulse rate, anorexia, or nervous irritability. Focal symptoms include increased expectoration or cough, pleurisy, blood spitting, or a feeling of tightness across the chest. *Any patient who feels worse after a bath than before has had too much sun.* In the event of any of the above symptoms manifesting themselves, the treatment should be omitted for a day or two, and then resumed with a shorter exposure. If the symptoms are at all severe, the treatment should be omitted until forty-eight hours after they have entirely subsided, and when resumed the exposure should be reduced, usually to as low as one-quarter of the dose causing the reaction. Persistent reactions under the above plan call for a discontinuance of the sun baths. If the patient's weight decreases or his general condition becomes worse, they should be discontinued. It may be possible to continue the air baths alone with beneficial results.

The use of artificial light is reserved for the days on which it is not possible to use the sun, and it is necessary to graduate the dose carefully until the patient's tolerance is established. Air baths should be given on such days if the weather will permit.

Following the bath a cool shower should be taken, followed by brisk drying and then a rest period.

In most cases the baths may be taken twice a day. The midday sun of summer is undesirable, especially in the semi-tropical sections of the southwestern states, and the time of exposure should be before 10 a. m. and after 2 p. m.; indeed, in the very hot weather the hours between 7 and 9 a. m. and 3 and 5 p. m. should be chosen. Care should be taken to shorten the exposure on unusually hot days.

Much of the confusion in the use of sun treatment has arisen from the fact that tables such as the above are followed in all cases. No greater mistake can be made. This is merely an outline of the maximum exposure which may be given. It is to be altered to suit the individual patient. Few will be able to follow it without interruption, and in many cases the maximum dose is never reached. The most important point in sun treatment is to individualize every patient. It should be noted that blondes as a class are more sensitive than brunettes, and their dose must usually be increased more slowly.

As stated above, in using artificial light it is necessary to graduate the dose and to develop the patient's tolerance just as with the sun. This is true of all forms of light and all types of lamps. There is a very general idea, assiduously fostered by some lamp manufacturers, that the ultra-violet rays are innocuous, and can be used practically *ad libitum*. This is by no means the case. It is possible to get severe burns and severe constitutional reactions with these artificial rays. To illustrate:

Mrs. K., aged 31, developed a cough in May, and soon after began to feel tired and to lose appetite and weight. She went to a diagnostician, who told her she was suffering from pulmonary congestion, but had not tuberculosis. He gave her a treatment with the Alpine lamp. That evening she developed acute pleurisy with a temperature of 102 degrees.

CONTRAINDICATIONS TO HELIOTHERAPY

Sun treatment is contraindicated in acute tuberculosis of all types, in the acute stages of a chronic tuberculosis, in chronic types with much fever, in those who have recently had hemorrhages, those who burn but do not tan, and the aged and those whose vitality is so depressed that they are unable to react.

Sun treatment should be tried in the chronic stage of all types of extrapulmonary tuberculosis, with the exception of advanced bilateral renal tuberculosis. Extrapulmonary lesions which are complicated by pulmonary involvement require the same care in their treatment as those cases which are purely pulmonary, and no patient with extrapulmonary tuberculosis should be subjected to sun treatment without a thorough examination of the lungs. Neglect of this precaution has been responsible for some very serious results.

In conclusion, heliotherapy should not be used to the exclusion of other valuable and well-tried methods of therapy. It is in no sense a substitute for them. Rest is just as essential, in fact more so, when heliotherapy is being used as when it is not. When the use of tuberculin is being considered, the physician will have to decide whether to start with tuberculin or heliotherapy. Both agencies produce congestion at the site of the lesion, and it is desirable to initiate the use of only one such instrumentality at a time. The patient's tolerance and reactions are to be carefully studied, and when the physician feels that he is in a position to differentiate between the effects of the remedy he is using and the additional one he is preparing to use, then this second remedy may be brought into play and the patient carried along with both. Depending upon the type of case and the judgment of the physician, preference will at times be given to heliotherapy and at other times to tuberculin. My personal feeling is that in tuberculosis of the eye and inoperable tuberculosis of the genito-urinary tract

it is a mistake to postpone the use of tuberculin, for in these cases it is the one specific remedy at our disposal, and valuable time may be lost awaiting results from other measures. Air baths may, however, be used in conjunction with tuberculin from the start.

SUMMARY

1. Properly used, sun and air baths are of definite benefit to many tuberculous patients.

2. They may be contraindicated because of (*a*) the type or stage of the disease or (*b*) inability of the patient to react owing to constitutional or acquired disabilities.

3. Their use requires a knowledge of dangers, a proper graduation of the dosage, and close observation for unfavorable reactions.

4. Neglect of these precautions may lead to serious and even fatal consequences.

5. Artificial sources of light may be used on dull days when the sun is not available.

6. Our present knowledge, while very incomplete, justifies the following statements: (*a*) It is desirable that the rays from these lamps approximate in composition those of the sun, and (*b*) The claims for the great superiority and freedom from danger of the ultra-violet light rays to the exclusion of the balance of the solar spectrum are not justified.

307 West Eighth Street.

DISCUSSION

RALPH B. SCHEIER, M. D. (490 Post Street, San Francisco)—The reports of the remarkable results obtained by Rollier in the treatment of tuberculous bone lesions have been followed by an indiscriminate and unscientific application of heliotherapy in all forms of tuberculosis. The improper use of this therapeutic measure will aggravate many cases of pulmonary tuberculosis and may even cause death.

I have had the opportunity of studying the results of the sun treatment in several hundred cases of pulmonary tuberculosis, while under careful observation in a sanatorium. The conclusions reached in reference to this method of treatment are quite in accordance with the views expressed by Doctor Howson and I trust that Doctor Howson's valuable contribution will serve as a note of warning in emphasizing the fact that great harm may be done unless considerable care is exercised in the selection of cases suitable for this form of treatment.

Recently, I observed two patients suffering from pulmonary tuberculosis who, contrary to advice, had persisted in exposing their chests for several hours daily to the sun's rays with a fatal result in one case and a marked relapse in the other. Both patients had limited lesions involving only the right apex. Previous to the sun exposure they had been making excellent progress. The cough had disappeared—the temperature had become normal and the expectoration had been reduced to less than 2 cc. daily. Both patients had been occupying a sleeping porch in common. Having read of wonderful results following the use of sun baths, they, contrary to advice given, persisted in exposing themselves for several hours daily. One of them had a sudden hemoptysis which was followed by a disseminated tuberculous process affecting both lungs and death occurred within a few months. The second patient soon exhibited signs of marked activity. Auscultation over the previously quiescent area revealed many moist râles and a considerable extension of the process. The cough returned and the expectoration increased. The temperature, which had been normal for a period of four months, showed a daily rise.

After a careful analysis of many cases of a like nature, I have discontinued the use of heliotherapy in the treatment of most patients suffering from pulmonary tuberculosis and use it mainly in extrapulmonary tuberculosis and in selected pulmonary cases of the fibrous type.

❀

ROLAND DAVISON, M. D. (The Desert Sanatorium of Southern Arizona, Tucson)—The truth of Doctor Howson's timely warning can only be fully appreciated by those of us who are constantly dealing with light as a therapeutic agent.

My experience with the various artificial sources of light is meagre. The advertisements of the manufacturers show spectra of these lamps, but they do not inform the user how much energy is produced in the ultra-violet region. Furthermore, carbon arc and mercury vapor lamps lose their ultra-violet efficiency with use. Atmospheric conditions in many places in our country unquestionably prevent radiation of short wave lengths from reaching the earth's surface. In the southwest, however, the amount of such energy reaching the earth's surface is much greater in amount than is produced by artificial sources of radiation.

Reference to increased metabolism from sun bathing requires qualification, for while there is evidence of increased breakdown of body protein, increase in the basal metabolic rate does not always occur.

Individuals cannot be said to derive benefit in proportion to the amount of tan they develop, for many blondes who never produce tan can be benefited greatly by sun bathing. Treatment of such persons is not contraindicated but the dosage of ultra-violet given to such persons should be carefully measured and increases made very slowly. Where the sun is used as a source of energy, a knowledge of the exact amount of ultra-violet energy which such radiation contains, is essential if the best results are to be obtained.

The benefits which are derived from the sun bathing are probably due to other factors than the ultra-violet contents of the light to which the patient is exposed. We are now making experiments to evaluate influences such as air movement, temperature of the air, and humidity.

At the Desert Sanatorium we no longer admit patients with the open form of pulmonary tuberculosis, for we found only a very small number of patients with this type of tuberculosis benefited by treatment with solar radiation at this particular place, though the most careful supervision was exercised, and care taken to prevent excessive radiation.

Too much attention has probably been focused on the depth to which short-wave-lengthed radiations pass. The action of ultra-violet radiation is largely photochemical in character and while a certain degree of penetrability is essential, it is unnecessary to have the short wave lengths penetrate below the superficial layers of the skin.

Aside from the local skin changes, the effect on the body is the product of the amount of surface exposed, the intensity of the radiation, and the time of exposure.

We give full body radiations and I can see no valid reason for covering the chest when the mode of action is considered. Our clinical experience does not justify covering the chest of patients with pulmonary disease.

Unquestionably a greater effect is obtained from fractional dosage than is obtained from a single long exposure, although the reason for this difference has not definitely been shown. Mid-afternoon exposures at Tucson cannot be given because of the great heat at that time. Additional reasons for giving all of our exposures during the morning include the fact that during the first hour following the radiation there is a shift, according to competent observers, in the hydrogen ion concentration of the body to the acid side which is followed by a shift to the alkaline side, the alkaline reaction persisting for a period of more

than twenty-four hours. We believe this shift in H is desirable.

Determination of the ultra-violet contents of sunlight at a wave length of 3200 Angströms as measured by the Pettit radiometer at the Desert Sanatorium shows a negligible amount of short-wave-lengthed radiations in the very early morning and in the late afternoon. It is probable also that a greater effect is obtained from similar dosage of ultra-violet at higher temperatures than is obtained at lower temperatures, a fact of more than minor importance.

All of these factors enter into the question of benefit or harm from sun bathing. The one important point to be borne in mind in giving heliotherapy is accuracy of dosage carefully controlled at all times, with daily supervision to avoid exceeding the individual patient's tolerance for radiation.

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DOCTOR HOWSON (closing)—The amount of tan developed is, of course, only a rough method of estimating the benefit derived or to be derived from the sunlight. I am of the opinion that in the case of those who do not tan benefit accrues chiefly from exposure to the air.

It is a matter of observation that when the chest is exposed to the sun's rays unfavorable reactions are more likely to occur than when other portions of the body of similar skin area are so exposed. For this reason a tolerance can more rapidly be developed at the outset if the chest be kept covered until tanning has begun. After the initial "seasoning" it is exposed with the rest of the body.

Much remains to be worked out regarding the factors enumerated by Doctor Davison. I am hopeful that the work now being undertaken at the Desert Sanatorium may add substantially to our meagre store of knowledge.

ABNORMAL KINKS AND BANDS IN THE ABDOMEN*

CASE REPORTS

By ALANSON WEEKS, M. D.
AND
G. D. DELPRAT, M. D.
San Francisco

DISCUSSION *by John Homer Woolsey, M. D., San Francisco; John Francis Cowan, M. D., San Francisco; Foster K. Collins, M. D., Los Angeles.*

THE relationship of anomalous abdominal bands and membranes to certain very definite subjective symptoms has been so ably discussed by others, and particularly by Dr. Alfred S. Taylor of New York,[1] that further exemplification would seem unnecessary. In our recent experiences, however, a number of cases have appeared which have run the gamut of various medical, and even surgical, procedures without relief, so that it would seem in order to review this condition briefly and submit a few typical cases.

CHRONIC PAINS IN THE ABDOMEN

During service as consultant for the Veterans' Bureau since 1919 the attention of one of us has been drawn to the many men and women patients who complained of chronic, uncertain pains in the abdomen. A number of these patients had been operated on previously for "chronic appendicitis." It was noticed that their operations were practically all done through very small McBurney incisions. Our own opinion is that the length of the incision should more often be a measure of the ability of the surgeon. We feel that a patient is not jeopardized more by a larger incision, and that if a patient must undergo an operation, then at least an incision large enough to allow the exploration to which he is entitled should be made.

The persistence of pain in these chronic invalids led us to explore the abdomens through long, right rectus incisions. We frequently encountered adhesions of the omentum to the ascending colon, which pressed into and constricted the latter to a marked extent. We also found adhesions in the region of the ileocecal valve which caused marked angulation or even partial blocking of the terminal ileum. From our small series we have reason to believe that one should always be careful to make an incision that can be enlarged sufficiently to permit exploration of the whole abdomen, should the pathologic condition diagnosed prove insufficient to account for the symptoms presented.

The following six cases may be taken as typical instances where marked permanent relief of the discomfort and disability from which the patients were suffering has been caused by the reduction of just such adhesions. Pain in the abdomen is the most frequent single symptom of which patients having these unusual bands or adhesions complain, but it is true that symptoms may occur due to changes in remote tissues or organs. The casual relationship of such symptoms may not be immediately evident, but it has been shown by Dr. Rea Smith of Los Angeles[2] and Dr. B. W. Williams of London[3] that the failure of some part of the ileocecal intestine to empty properly allows a perversion of the intestinal flora, and this in turn constitutes an intestinal focus of infection. Just as infected teeth or tonsils can be responsible factors in polyarthritic changes, so it is claimed, can this pooling in the intestine produce similar results. If the arthritis is cured by the treatment of the infected teeth and tonsils, it would seem reasonable that it should be similarly alleviated by correction of this retardation of fecal movement in the colon.

Two years ago Doctor Smith[4] wrote a paper entitled "Brief Outline of the Cause and Treatment of Polyarthritis," in which he stated that the removal of the right colon for polyarthritis was rather a formidable procedure in debilitated patients. This drove him to search for a less severe treatment, and he called our attention to the constricting band just above the head of the cecum which interfered with the proper emptying of that organ. His results would indicate that such bands and kinks are the cause of chronic invalidism.

CASE REPORTS

CASE 1—Nurse. Reported for treatment in January, 1922. She had suffered from vague abdominal distress for years, and from pains in the right upper quadrant, which suggested chronic gall-bladder disease. Her appendix had been removed in 1914. X-ray examinations were reported negative, for few roentgenologists at that time observed or reported poolings in the bowel.

A long, right rectus incision was made and the upper abdomen thoroughly explored. The gall bladder was without adhesions and apparently normal. The incision was extended downward and the pelvic or-

* Read before the Surgical Section of the San Francisco County Medical Society, October 18, 1927.